Multi-Engine Maneuvers Guide

Seneca PA34-200T

V Speeds

V speed	CAS (MPH)	Description	Airspeed Indicator Marking
V_{SO}	70	Stall Speed in Landing Configuration	Bottom of White Arc
V_S	76	Stall Speed with No Flaps	Bottom of Green Arc
V_{MC}	80	Minimum Controllable Airspeed	Red Line
V_R	80-85	Rotation Speed (Start Rotate)	
V_X	90	Best Angle of Climb	
V_{XSE}	93	Best Angle of Climb Single Engine	
V_{SSE}	90	Safe Speed for Intentional Engine Failure	
V_G	90	Best Glide	
V_Y	105	Best Rate of Climb	
V_{YSE}	105	Best Rate of Climb Single Engine	Blue Line
V_{FE}	125	Maximum Flap Extended Speed	Top of White Arc
V_{LR}	125	Maximum Gear Retraction Speed	
V_{LE}	150	Maximum Gear Extension Speed	
V_{LO}	150	Maximum Speed with Gear Extended	
V_A	140	Maneuvering Speed	
V_{NO}	190	Maximum Structural Cruising Speed	Top of Green Arc
V_{NE}	224	Never Exceed Speed	Red Line
V_{seapp}	105	Single Engine Approach Speed	
Max Demonstrated Crosswind 20 knots			

Pre Take-Off Briefing

1. **Engine failure prior to rotation,**
   Retard the throttles to idle and stop straight ahead on the remaining runway and secure the aircraft.

2. **Engine failure occurs after rotation and with no remaining runway or over-run area**,

   Throttles Max Power (40" MP)
   Propellers Full Forward
   Mixtures Full Rich
   Flaps Up
   Gear Up
   Identify, Verify, Feather, Secure the inoperative engine

Updated: 07/14/2016

In-Flight Engine Failure

1.	"Blue Line"	
2.	Mixture	FORWARD
3.	Propeller	FORWARD
4.	Throttles	FORWARD
5.	Flaps	UP
6.	Gear	UP
7.	Electric Fuel Pump	ON
8.	Identify Dead Engine	DEAD FOOT
9.	Verify Throttle	CLOSE ON DEAD ENGINE
10.	**Critical Phase of Flight: PROP FEATHER, Mixture Lean, Zero Side Slip**	

Troubleshoot

Non-Critical Phase of Flight - attempt to restore power **prior to feathering**

a. Inoperative Engine Throttle……Half
b. Mixture……Full Rich
c. Fuel Pumps……On
d. Fuel Selector……Cross Feed on Dead Engine Only
e. Magnetos……Toggle on Dead Engine Only
f. Alternate Air……On **(If no change after 5-10 seconds-off)**

***If engine still inop: continue checklist**

11.	Inoperative engine **Prop**	**FEATHER**
12.	Inoperative engine Mixture	**IDLE CUT OFF**
13.	Trim	AS REQUIRED
14.	Maintain 3-5 degrees bank toward operating engine	

Engine Failure Secure

1.	Inoperative engine Fuel Pump	OFF
2.	Inoperative engine Magnetos	OFF
3.	Cowl Flaps	CLOSE INOPERATIVE AS REQUIRED OPERATIVE
4.	Inoperative engine Alternator	OFF
5.	Electrical Load	REDUCE
6.	Inoperative engine Fuel Selector	OFF (Consider Cross feed)
7.	Operative engine Fuel Pump	OFF

*Private: Private Pilot PTS FAA-S-8081-14B
*Commercial: Commercial Pilot PTS FAA-S-8081-12C

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Air Restart

1.	Avionics	OFF
2.	**Verify Both Fuel Pumps OFF prior to restart**	
3.	Inoperative engine Fuel Selector	ON
4.	Inoperative engine Throttle	OPEN ¼ Inch
5.	Inoperative engine Propeller	FORWARD
6.	Mixture	RICH
7.	Inoperative engine Magnetos	ON
8.	Pitch	120 MPH
9.	Starter	ENGAGE till prop windmills
10.	Throttle	REDUCE until engine is warm (10"-15")
11.	Alternator *If engine does not start	ON
12.	Inoperative engine Fuel Pump	On for 3 seconds And then repeat Air Restart
13.	Avionics	ON

*Private PTS: Maintains altitude ±100 feet, or minimum sink as appropriate and heading ±10°, bank ±5°, and levels off from climbs and descents within ±100 feet

*Commercial PTS: Maintains altitude ±100 feet, or minimum sink as appropriate and heading ±10°, bank ±5°, and levels off from climbs and descents within ±100 feet

Maneuver's Flow Check

1.	Clear Area (Two 90° Turns)	
2.	Fuel Selectors	ON
3.	Trim	SET
4.	Flaps	As Required
5.	Cowl Flaps	As Required (think engine cooling)
6.	Alternate Air	OFF
7.	Mixture	As Required
8.	Props	As Required
9.	Throttles	As Required
10.	Landing Gear	As Required
11.	Engine Gauges	Check

Normal Take-Off (0° Flaps)

1. Hold the brake and run the engine up to 2000 RPM – Check engine gauges
2. Release Brakes, Throttle 39" (**Maximum 40" MP – Do Not Exceed)**
3. Accelerate to **85 MPH** and start rotation
4. Above 100 MPH, Tap Brakes and bring up the Landing Gear
5. Climb out at **105 MPH** (Blue line/V_{YSE}), Max Throttles until 500' AGL
6. Climb out at **120 MPH** after passing through 500' AGL (better engine cooling)
7. Reduce Throttles to 31.5" MP and Props to 2450 RPM

*Private PTS: Maintains takeoff power and Vy +10/-5 knots to a safe maneuvering altitude.

*Private: Private Pilot PTS FAA-S-8081-14B Updated: 07/14/2016
*Commercial: Commercial Pilot PTS FAA-S-8081-12

*Commercial PTS: Maintains takeoff power and Vy ±5 knots to a safe maneuvering altitude.

Short Field Take-Off *(0° Flaps)*

1. Hold brakes at end of the runway and run the engine up to 2000 RPM – Check engine gauges
2. Throttle **39" MP**, Release Brakes
3. Rotate at **80 MPH**, Pitch for **85 MPH** through 50' obstacle
4. Tap Brakes and Gear Up when a positive rate of climb is established
5. Accelerate to 90 MPH (V_X), or **105 MPH** (V_Y) if obstacle is cleared
6. Reduce Throttles to 31.5" MP and Props to 2450 RPM after passing through 500' AGL

*Private PTS: Establishes a pitch attitude that will maintain the recommended obstacle clearance airspeed, or VX, +10/-5 knots, until the obstacle is cleared, or until the airplane is 50 feet above the surface.

*Commercial PTS: Establishes a pitch attitude that will maintain the recommended obstacle clearance airspeed, or VX, +5/-0 knots, until the obstacle is cleared, or until the airplane is 50 feet above the surface.

Normal Approach and Landing

1. Slow to 115 MPH prior to entering the traffic pattern
2. Airspeed **115 MPH** on Downwind (17"MP, 2250 RPM)
3. Gear Down *Before* Midfield Downwind
4. Flaps as required:
    a. 10° - Below 160 MPH
    b. 25° - Below 140 MPH
    c. 40° - Below 125 MPH
5. Airspeed **110 MPH** on Base (17"MP, 2250 RPM)
6. Airspeed **95 MPH** on Final (15"MP, Props 2550)
7. Maintain back pressure on control yoke to prevent slamming the nose wheel on the runway and to improve braking effectiveness
8. Retract Flaps after touchdown
9. Minimal Breaking until after flaps are retracted

*Private PTS: Maintains a stabilized approach and recommended airspeed, or in its absence, not more than 1.3 V_{SO}, +10/-5 knots, with wind gust factor applied. Touches down at of within 400 feet beyond a specified point.

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*Commercial PTS: Maintains a stabilized approach and recommended airspeed, or in its absence, not more than 1.3 V_{SO}, +10/-5 knots, with wind gust factor applied. Touches down at of within 200 feet beyond a specified point.

Short Field Approach and Landing

1. Slow to 115 MPH prior to entering the traffic pattern
2. Airspeed **115 MPH** on Downwind
3. Gear Down *Before* Midfield Downwind- Perform first GUMPPSS
4. Flaps as required:
    a. 10° - Below 160 MPH
    b. 25° - Below 140 MPH
    c. 40° - Below 125 MPH
5. Airspeed **110 MPH** on Base – Perform second GUMPPSS
6. Airspeed **87 MPH** on Final (40° flaps) – Perform final GUMPPSS
7. Close Throttles slowly and flare, touchdown with little or no floating
8. Maintain back pressure on control yoke to prevent slamming the nose wheel on the runway and to improve braking effectiveness
9. Retract Flaps after touchdown
10. Announce "Simulate Max Breaking"

*Private PTS: Maintains a stabilized approach and recommended airspeed, or in its absence, not more than 1.3 V_{SO}, +10/-5 knots, with wind gust factor applied. Touches down at of within 200 feet beyond a specified point

*Commercial PTS: Maintains a stabilized approach and recommended airspeed, or in its absence, not more than 1.3 V_{SO}, ±5 knots, with wind gust factor applied. Touches down at of within 100 feet beyond a specified point

Go-Around

1. Apply take-off power to both engines **(Maximum 40" MP)**
2. Establish positive climb attitude
3. Retract 40° Flaps to 25°, Airspeed **90MPH** (V_X)
4. Retract Landing Gear
5. Slowly retract remaining Flaps
6. Adjust Cowl Flaps for adequate cooling

*Private: Private Pilot PTS FAA-S-8081-14B Updated: 07/14/2016
*Commercial: Commercial Pilot PTS FAA-S-8081-12C

*Private PTS: Applies takeoff power immediately and transitions to climb pitch attitude for VX or VY as appropriate +10/-5 knots and/or appropriate pitch attitude. Maintains takeoff power and V_Y +10/-5 knots to a safe maneuvering altitude

*Commercial PTS: Applies takeoff power immediately and transitions to climb pitch attitude for VX or VY as appropriate +10/-5 knots and/or appropriate pitch attitude. Maintains takeoff power and V_Y ±5 knots to a safe maneuvering altitude

ILS Approach One or Two Engines

1. Complete the "Pre Landing Checklist" and Identify the localizer when able
2. Set the inbound course in NAV 1
3. Maintain **115 MPH** until glide slope intercept
4. Check for flags at glide slope intercept and marker
5. Extend Landing Gear and Flaps 10°
6. Descend on glide slope at **105 MPH/Blue line** or 115 considering traffic
7. Announce out of 1000' above DH/MDA: 1000' above minimums
8. Maintain **105 MPH/Blue line** from 1000' above DH/MDA inbound, until runway in sight
9. Announce "Minimums"
10. Maintain **95 MPH**, once runway is in sight

Non-Precision Straight-In Approach One or Two Engines

1. Complete the "Pre Landing Checklist" and Identify the NAV Aid when able
2. Maintain **115 MPH** clean (gear up, flaps up) during procedure turn outbound and inbound to FAF
3. Set the inbound course in NAV 1
4. The aircraft is considered established inbound when the course is alive
5. Check for flags
6. Extend Landing Gear, Flaps 10°
    a. Two-Engine: just prior to FAF
    b. Single-Engine: No earlier than the FAF because of drag induced
7. Two Engine: Descend at 105 MPH-115 MPH and 800-1000 FPM
8. Single Engine: Descend at **105 MPH** and 800-1000 FPM
9. Announce out of 1000' AGL: "Blue line"
10. Maintain **105 MPH/Blue line** from 1000' AGL inbound, until runway in sight
11. Announce "Minimums"
12. Maintain **95 MPH**, once runway is in sight
13. Maintain MDA **(plus 50', minus 0')**
14. Runway in sight: Descend at VDP or maintain MDA to MAP
15. Do not leave MDA until landing is assured
16. When descending from MDA: Flaps 25° (single engine), verify and announce: "Gear Down Stabilized"

*Private/Commercial PTS: Maintains altitude within 100 ft, airspeed within ±10 knots if within the aircrafts capability, and heading ±10°. On final approach segment, no more than ¾ scale deflection of the CDI/glide slope indicator

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*Commercial: Commercial Pilot PTS FAA-S-8081-12C

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Slow Flight

1. Cruise Power
2. Set Heading Bug to entry heading
3. Clearing Turns
4. Throttles to 15" MP
5. Maneuver Checklist:
    a. Flaps — DOWN
    b. Cowl Flaps — OPEN
    c. Mixture — As Required
    d. Props — **FULL FORWARD**
    e. Throttles — **15" MP (or just above gear horn sounding)**
    f. Landing Gear — DOWN
    g. Engine Gauges — Check
6. Slow to just above stall (Stall warning chirping)
7. Power for Altitude, Pitch for Airspeed

Recovery

1. Full Power (**40" MP max, 2550 RPM)**
2. Flaps reduced to 25°
3. Positive Rate, Gear Up
4. Retract remaining flaps in increments
5. Maintain altitude, Accelerate to cruise airspeed, Trim for level flight, Airspeed 135-145, MP 21", 2400 RPM, Fuel flow set as required
6. Cruise Checklist

*Private PTS: Maintains the specified altitude ±100 feet; specified heading ±10°; airspeed +10/−0 knots and specified angle of bank, ±10°

*Commercial PTS: Maintains the specified altitude ±50 feet; specified heading ±10°; airspeed +5/-0 knots and specified angle of bank, ±5°

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Power-Off Stall (3000' AGL Minimum)

1. Cruise Power
2. Set Heading Bug to entry heading
3. Clearing Turns
4. Throttles to 15"MP
5. Maneuver Checklist:
    a. Flaps — DOWN
    b. Cowl Flaps — OPEN
    c. Mixture — As Required
    d. Props — **FULL FORWARD**
    e. Throttles — **15" MP (or just above gear horn sounding)**
    f. Landing Gear — DOWN
    g. Engine Gauges — Check
6. Flaps 40° below **125 MPH**
7. Descend at normal approach speed (**95 MPH**)
8. Reduce Throttles to Idle
9. Transition smoothly to approx. 12° pitch up
10. Pitch for stall
11. Initiate recovery at first buffet

Recovery

1. Reduce angle of attack
2. Throttles **40" MP maximum**
3. Flaps reduce from 40° to 25°
4. Landing gear up
5. Pitch for **90 MPH** or **105 MPH**
6. Reduce flaps in increments with Positive Rate of Climb
7. Maintain altitude, accelerate to cruise airspeed, **Trim for Level Flight**, Airspeed **135-145, MP 21", 2400 RPM;** fuel flow **as required**

*Private PTS: Maintains the specified heading ±10°, if in straight flight; maintains a specified angle of bank not to exceed 20°, ±10° if in turning flight, while inducing the stall.

*Commercial PTS: Maintains the specified heading ±10°, if in straight flight; maintains a specified angle of bank not to exceed 20°, ±5° if in turning flight, while inducing the stall.

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Power-On Stall (3000' AGL Minimum)

1. Cruise Power
2. Set Heading Bug to entry heading
3. Clearing Turns
4. Maneuver Checklist:
    a. Flaps — UP
    b. Cowl Flaps — OPEN
    c. Mixture — As Required
    d. Props — **FULL FORWARD**
    e. Throttles — As Required
    f. Landing Gear — UP
    g. Engine Gauges — Check
5. Decrease throttle to slow to rotate speed **85 MPH**
6. Slowly pitch up to 10°-12° while increasing power to **20" MP**
7. Pitch for stall attitude (airspeed should decrease no more than one mph per second)

Recovery

1. Reduce angle of attack
2. Throttles **40" MP maximum**
3. Pitch for **90 MPH** or **105 MPH**
4. Maintain altitude, accelerate to cruise airspeed, **Trim for Level Flight**, Airspeed **135-145, MP 21", 2400 RPM;** fuel flow as required
5. Cruise Checklist

*Private PTS: Maintains the specified heading ±10°, if in straight flight; maintains a specified angle of bank not to exceed 20°, ±10° if in turning flight, while inducing the stall.

*Commercial PTS: Maintains the specified heading ±10°, if in straight flight; maintains a specified angle of bank not to exceed 20°, ±10° if in turning flight, while inducing the stall.

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Steep Turns

1. Cruise Power
2. Set Heading Bug to entry heading
3. Clearing Turns
4. Maneuver Checklist:
    a. Flaps — UP
    b. Cowl Flaps — CLOSED
    c. Mixture — As Required
    d. Props — **2500 RPM**
    e. Throttles — **18"**
    f. Landing Gear — UP
    g. Engine Gauges — Check
5. Airspeed: less than (V_A) 133-146 MPH
6. Enter 360 degrees Left Steep Turn
7. Increase MP to 21-23 inches as needed to **maintain airspeed**
8. Roll out on entry heading
9. Perform 360 degrees Right Steep Turn
10. Roll out on entry heading

*Private PTS: **Bank 45°;** Maintains the specified altitude ±100 feet; specified entry heading, ±10°; airspeed ±10 knots and specified angle of bank ±5°

*Commercial PTS: **Bank 50°;** Maintains the specified altitude ±100 feet; specified entry heading ±10°; airspeed ±10 knots and specified angle of bank ±5°

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VMC Demo

1. Cruise Power
2. Set Heading Bug to entry heading
3. Clearing Turns
4. Maneuver Checklist:
    a. Flaps — UP
    b. Cowl Flaps — Closed on Inoperative engine; Open on Operative engine
    c. Mixture — As Required
    d. Props — Full Forward
    e. Throttles — As Required
    f. Landing Gear — UP
    g. Engine Gauges — Check
5. Left Throttle: Close (Wind milling Propeller)
6. Right Throttle: Full Power
7. Establish 5° Bank angle towards operative engine; rudder and aileron to maintain heading
8. Pitch: MAINTAIN BLUE LINE MOMENTARIALY
9. Slowly increase pitch up to decrease airspeed at no more than 1 MPH per second

Recovery

~ At first sign of: Loss of Directional Control or First Indication of a Stall (horn of buffet)

1. Reduce to half power on operating engine and decrease pitch to regain directional control within 20° of entry heading.
2. Increase power slowly on operating engine
3. Pitch to maintain **Blue Line (105 MPH)**
4. Bring left and right throttle together slowly to **20" MP**. Props to **2400 RPM**.
5. Both engine to Cruise Power
6. Cruise Checklist

*Private PTS: Recovers within 20° of the entry heading; Accelerates to V_{YSE} +10/-5 knots

*Commercial PTS: Recovers within 20° of the entry heading; Accelerates to V_{YSE} ±5 knots

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Drag Demo

1. Cruise Power
2. Set Heading Bug to entry heading
3. Clearing Turns
4. Maneuver Checklist:
    a. Flaps — UP
    b. Cowl Flaps — Closed on Inoperative engine; Open on Operative engine
    c. Mixture — As Required
    d. Props — Full Forward
    e. Throttles — As Required
    f. Landing Gear — UP
    g. Engine Gauges — Check
5. Throttle on Inoperative Engine – Set Zero Thrust (**11"MP)**
6. Throttle on Operative Engine – Maintain Altitude and Blue Line
7. Demonstration

Note: Pitch for **Blue line** during configuration changes

1. Adjust **pitch** up then down to **vary airspeed** from blue line and note performance
2. **Landing gear down** and note rate of descent
3. **Flaps down** one by one, note rate of descent
4. **Throttle on inoperative engine to idle** & note rate of descent
5. "Clean Up" configurations one item at a time and note performance increase

Recovery

1. Warm up engine (approx. 2400 RPM and 15" MP) until cylinder head temperature is in the green
2. Cruise Checklist

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Emergency Descent

1. Cruise Power
2. Clearing Turns
3. Maneuver Checklist:

c.	Flaps	UP
d.	Cowl Flaps	CLOSED
f.	Mixture	As Required
g.	Props	As Required
h.	Throttles	As Required
i.	Landing Gear	As Required
k.	Engine Gauges	Check

4. Introduce simulated emergency
5. Throttles — IDLE
6. Props — HIGH RPM
7. Gear — DOWN below **150 MPH**
8. Bank — **45°**
9. Airspeed — **MAX 135 MPH** (for demonstration purposes)

Recovery

1. Adjust aircraft for straight and level flight (wings level and then pitch up)
2. Gear — RETRACT Below **125 MPH**
3. Throttles — 18-22" MP
4. Props — 2400 RPM
5. Cruise Checklist

*Private PTS: Exhibits satisfactory knowledge.

*Commercial PTS: Maintains the specified airspeed +0/-10 knots and levels off at specified altitude ±100 ft

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